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ABSTRACT

New tools, whether developed organizationally, commercially, or within a domain may represent innovation in the workplace and can be part of larger scale reform and change. The focus of this research is on exploring the roster of issues arising as the theory of communities of practice is applied to specific cases of online professional development of teachers and medical practitioners. This paper is a bounded history of two research projects and their advancement to date. The tools "Prodigy," a computerized decision support system and "StageStruck," a performing arts knowledge construction tool are both recognized in their fields as being innovative in both their use of technology and for their potential to improve the practice within the domain. This paper explores the rationale for developing a Web-based communication and resource area to support a community of practitioners in their implementation of these technological innovations. The dialogue explores the demographics, design, and development issues faced by community managers charged with promotion and support of these innovative products. (Contains 23 references.) (Author)

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Abstract: New tools whether developed organisationally, commercially or within a domain may represent innovation in the workplace and can be part of larger scale reform and change. This paper examines community-based web sites to being built about tools in two distinctly different workplaces. The tools *PRODIGY*, a computerised decision support system and *StageStruck*, a performing arts knowledge construction tool are both recognised in their fields as being innovative in both their use of technology and for their potential to improve the practice within the domain. This paper explores the rationale for developing a web-based communication and resource area to support a community of practitioners in their implementation of these technological innovations. The dialogue explores the demographics, design and development issues faced by community managers charged with promotion and support of these innovative products.

The Rationale for Growing Communities of Practice as On-Line Support

Background

The research and product design detailed here set out to ask what part can be played by well-researched and designed on-line activities in shaping the future of, and meeting the needs for change. Over time the community of practice (Lave & Wenger, 1991) emerged as a complex yet attractive solution and the focus to mapping the development and efficacy of a web-mediated community of practice in advancing implementation of an innovation. The focus of this research explores the roster of issues arising as the theory of communities of practice is applied to a specific cases of

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on-line professional development of teachers and medical practitioners. This paper is a bounded history of the two research projects and their advancement to date.

The dilemma for the developers of both products was to identify and establish ways to promote the diffusion of these technological innovations and to provide valuable and effective professional development towards implementation for the practitioners who do or plan to use them. The community of practice (Wenger, 1998) model emerged for both development teams as an effective strategy for dissemination and knowledge building around the use of these products. This community of innovators will be supported through a purpose-built Web site designed to afford the opportunities and activities that are characteristic of the making of meaning that is at the heart of the community of practice.

The products in outline

PRODIGY (www.prodigy.nhs.uk) is a computerised decision support system (DSS), which provides evidence-based recommendations for the management of a condition in a clinical setting. It sits within existing clinical computer systems and integrates with the electronic patient record. It is in itself an innovation and is part of a reform to the use more of evidence-based medicine (EBM), guidelines and protocols and the computer within the consultation to access this information.

STAGESTRUCK *(www.stagestruck.uow.edu.au)* is recognised as an innovation in the teaching of the performing arts. It is an innovation both as a constructionist multimedia technology for creative and performing arts teaching and learning. More broadly it has been recognised as a pedagogical innovation because of its constructivist underpinnings and the design realisations as a multimedia knowledge construction tool (Hedberg, 1997). In both cases the innovation is a new computer-based tool and that tool that is part of a reform process as well as an increasing application of technology in the practice.

The Theoretical Basis for Community of Practice

Whether change is based on the 90's call to the 'learning organization' (Senge, 1990) or the new millennium's 'knowledge-based organization' (Wenger, 1998), the key to reform appears to be the way the organisation values knowledge and its management. Botkin, (1999, pp.3-4) states 'Good ideas are knowledge waiting to be tapped, and it's the trademark of a smart organization – a fast company – that it knows how to honour and legitimise the tacit knowledge that its people have stored up in their work practices and make it visible.'

Wenger contends that the sharing of tacit corporate knowledge is vital to the organisational success. The knowledge Wenger speaks of is not static. It cannot be fleshed out and then documented in a set of guidelines nor distilled into a discrete data set and stored in an information retrieval system. It is that practitioner knowledge that those in the field, workshop or classroom share on an ongoing and usually need-to-know or need-to-share basis. Co-workers help each other to solve problems, affirm actions, seek new challenges, and in doing so advance the goals of the organisation and the practice.

A community of practice specifically centres its interest on the practices of the workplace. McDermott (1999 pp.1) simply and succinctly distinguishes the community of practice from other types of communities. 'But communities of practice are not just celebrations of common interests. They focus on practical aspects of a practice, everyday problems, new tools, developments in the field, things that work and don't.' While these communities are obviously not new the recognition of their value to education and industry is. In a summary of complexity theory and educational change processes, Fullan (1999, pp.15) supports Wenger's contention about the value of sharing tacit knowledge. 'In brief, the secret to success of living companies, complex adaptive systems, learning communities or whatever terms we use, is that they consist of intricate, embedded interaction inside and outside the organization which converts tacit knowledge to explicit knowledge on an ongoing basis.'

Given the community of practice seems to lend itself as a model for dissemination and professional development, the next question became; How can that community be developed and /or supported on-line? It is necessary to explore

each of the individual innovations and their on-line stages of development towards community to see how similar these two disparate communities really are.

The Tools Examined *Product 1: PRODIGY*

At the present time PRODIGY can be used by General Practitioners (GPs) in England and has the potential, subject to legal changes, to be used by other health professionals such as nurses and pharmacists. There are various potential uses of PRODIGY including during a consultation to provide options for prescribing, non-drug advice, patient information leaflets and referral advice. It also includes referenced clinical information to access outside the consultation, enabling GPs to keep up to date and abreast of the latest developments in prescribing and healthcare.

The PRODIGY project team consists of Research and Evaluation, Software Development, Authoring and the National Dissemination Office (NDO) (www.schin.ncl.ac.uk). These groups are crucially interdependent in developing the technology, updating clinical content and promoting PRODIGY use amongst the GP community. The NDO model of dissemination is based upon an integrated approach of communications and marketing, training and education and support (Figure 1).

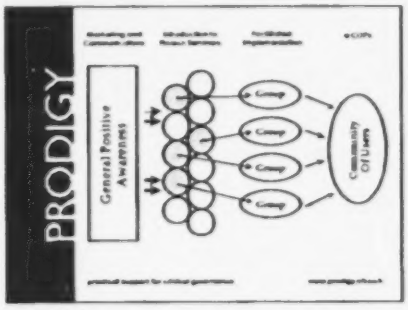

Figure 1 The PRODIGY Dissemination model developed and implemented during 2001

The support element of the model comprises the website, including access to the clinical guidance, education and training materials, GP system supplier specific information and the development of an on-line community of practice (e-CoP).

The Domain and Practice

GPs work predominantly in an individualistic way characterised by a high level of autonomy their in decision making. As a discipline they tend according to McWhinney (1996) to define themselves in terms of their relationship with the patient, which takes precedence over a more mechanistic approach to medicine. The effect of this value on relationships, places experience rather than disengaged reason, at the heart of general practice decision-making where he argues, *"experience engages... feelings as well as... intellect"* (McWhinney, 1996, p433). The impact of these characteristics is likely to affect the decision-making processes specifically in relation to the use of evidence-based medicine (EBM), guidelines and protocols and the use of the computer within the consultation to access this information.

The use of EBM by GPs has been identified as problematic (Mears & Sweeney, 2000; Cranney et al, 2001) displaying GPs mistrust of the research and it's applicability in a specific patient context. In this respect GPs may regard PRODIGY as a threat to the more traditional and intuitive ways of working and GP autonomy in decision-making. With this in mind, the community of practice being developed for PRODIGY users aims to facilitate a forum through which GPs can share their views and knowledge about using PRODIGY in a practical environment. This also provides an opportunity to discuss the application of PRODIGY in relation to other NHS goals such as National Service Frameworks (NSFs), Clinical Governance (CG) and re-validation.

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On-line Community of Practice Design (e-CoP)

The PRODIGY website has been designed to reflect the multi-faceted nature of PRODIGY not merely as a decision support tool, but in providing referenced material used in the production of the guidance, patient information leaflets, and background information about specific conditions listed in PRODIGY. Whilst GPs may commonly use the computer for routine tasks such as repeat prescribing, the use of the computer during the consultation is less frequent (SCHIN, 2001a). The website aims to offer practical contextual support and information in relation to using the computer in the consultation (UCCR), as well as highlighting how using PRODIGY will support GPs in relation to Clinical Governance and National Service Frameworks.

Three types of visitors to the website are envisaged; *non-users but potential users* who are seeking information about what PRODIGY is, what it does and how they can use it. *Current users* who are seeking ways to use PRODIGY in a broader context; and *non-users* interested in promoting and facilitating use, for example Primary Care Trust (PCT) trainers, GP Clinical System Suppliers. One of the functions of the website is to provide training support, information about how PRODIGY can be switched on, and how PRODIGY can be recognised on the different GP computer systems. Therefore the website and the development of the community of practice is intended very much as an ongoing support service to users and potential users of PRODIGY.

In the first instance the aim is to develop, facilitate and sustain an electronic community of practice for users described above. The methodology and framework, which will be formulated during the development of this user group, can then be used to extend the ocommunity to other groups within the UK healthcare domain. It allows anonymity amongst users, with the potential for different professionals to communicate more freely (i.e. GPs and nurses) in a relatively safe environment. Initially a member of the NDO team and a GP working for SCHIN will facilitate the e-Community of Practice. The structure of the e-CoP is based on asynchronous message boards, email lists and a messaging tool, rather than a chat facility.

In order to access the current PRODIGY community of practice users have to be registered and given a login. This has been kept deliberately simple at this stage so as not to deter users from registering, and currently identifies to SCHIN staff the email address and professional group of the user. Since the commencement of registration in February 2002 the number of registered users at July 2002 was approaching 3000. This figure continues to increase with an average of 80 new registrations per week. The benefits of being a registered user are; access and potential to participate in the message boards; ability to register for a discussion list; and an onsite messaging tool enabling users to make direct contact with other registered users, without disclosing personal identities.
Users will eventually have a profile around key interests[1] of users and encouraged through the facilitators to generate discussion topics within and between different participants. Invited 'experts', for example PRODIGY GP Champions, technical IT people, and clinical authors will also be used to lead particular discussions around their area of interest. Registered users will be encouraged to submit further detailed information through the use of the online message tool, normal email to all those who have given permission to receive more PRODIGY information, and online banners and bulletins on the PRODIGY site.

Through the extension of the user profiles registered users will also be able to search for other community members with specific interests, enabling the organic growth of communities. It is hoped that through the growth of such communities the development and transfer of knowledge will take place both within the community and to the "outside world" including informing further PRODIGY development.

The steady increase and high numbers of registrations is very encouraging although further work still needs to be done to ascertain their actions whilst on the site. Despite this the use of the message board and email lists have been slow to develop. It is not unusual for it to take time for such tools to be fully embraced, or for communities to shift from a demographic group to being a network (Diagram, 1). The planned facilitation is to continue to encourage use through the website, but to also be aware of any hot issues arising that might provoke discussion or the need for GPs to communicate quickly and directly. Plans are afoot to place a news banner containing the latest health-related headlines and provide a link to the message board to encourage discussion around this topic.

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[1] Cancer Referral Advice, Cardiovascular System, Dermatology, Eyes and Ears, Gastrointestinal, Haematology and Endocrine, Infection, Injuries, Neurology, Obstetrics and Gynaecology, Psychiatry, Respiratory, Rheumatology and Orthopaedics, Urology

This is only the beginning of the establishment of an online community of practice, but feedback is constantly sought from users through the message board and email lists. The future development of PRODIGY will be to encourage use by different health professionals (i.e. nurses and pharmacists) as well as GPs, and this might provide new and different needs from users.

The PRODIGY e-CoP project is still in the early stages and whilst modelled on existing communities of practice and experiences, the success and growth of such a community cannot be foreseen, and will largely depend upon the shared needs and experiences of the community itself. However, the role of the facilitators is to try and establis h the framework and support as necessary conditions to enable it to take place. It will be a learning experience for all those concerned.

The Tools Examined Product 2: Stagestruck

Figure 2 StageStruck Online Community Design

StageStruck, produced by Wollongong University and National Institute for Dramatic Art (NIDA), was one of 10 CD-ROMs produced in *Australia on CD* as a Creative Nation[1] federally funded Cultural program. Over $AU6 million was committed to produce 10 CD-ROMs designed to bring Australian culture to the public using new media technologies. Sadly it was never intended nor were any resources committed to any promotion or professional development for teachers in each or any of these products. Copies were distributed to every school in the country in the first semester of 1999. *StageStruck* has been recognised as an innovation in the performing arts. It is an innovation both as a multimedia technology for creative arts teaching and learning. More importantly it has been recognised as a pedagogical innovation because of its constructivist underpinnings and design realisations as a multimedia knowledge construction tool (Harper & Hedberg, 1997). Despite widespread distribution and acclaim, having won several prestigious Australian and International awards (AMIA 1999, BAFTA and EMMA 1998), preliminary discussions with educators indicated that many (perhaps most) are unaware of *StageStruck's* existence let alone its educational benefit.

The Domain and Practice

While healthcare reforms might seek a move to more evidence based medicine, educational momentum moves toward the creation of more constructivist and constructionist learning environments. Tools are being developed to motivate new teaching practices and support constructivist student-centred learning and StageStruck has been recognised an exemplar amongst those tools. In-service teachers are in many ways as independent and inexperienced with, and mistrustful of, new technology as many medical practitioners. Reilly sums up the in-service teachers' lack of connectedness graphically when he states that; *Educators are "islands of excellence" with no ferry service to connect them to each other or to groups of their peers.* (Reilly 1999 p60)

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[1]Creative Nation Australia's Cultural Network http://www.acn.net.au/articles/1998/05/ozcd.htm

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The group being formed around StageStruck might develop into a community or the Web site might stand to service smaller face-to-face communities in the in-service domain. This K-12 creative and performing arts community did not exist before people were drawn to become members on-line. While members are likely to each belong to other communities and they may have ties through these to some members on-line, no one community already exists that ties all the disparate groups (primary, secondary, drama, dance, design, creative arts, English) and distributed individuals together. They do more correctly constitute a demographic group (Andrews et al, 2001 pp.1) with the potential to become a community if ties and roles can be effectively established through the on-line engagement and collaboration.

Adoption of curriculum and pedagogical uses of technology in schools has been slow and inconsistent. This lack of adoption can be linked directly to the lack of resources devoted to in-service teacher professional development or to the ineffectual nature of the training offered. Teacher needs in relation to ICT beyond access to the technology (hardware and software) have consistently been for effective professional development with explicit links to curriculum and the "stuff" of classroom teaching. As hardware and high speed connectivity becomes more readily available in classrooms, educators are turning to focus more on the issues of support, ongoing professional development, recognition of ICT skills and leadership, accreditation for high level skill development, access to high quality resources and equity delivery formats and languages.

The National Foundation for the Improvement of Education Report *Teachers Take Charge of Their Learning* (NFIE 1996 pp.1) asserts that; *To improve student achievement, public schools must weave continuous learning for teachers into the fabric of the teaching job. This work can and should be initiated by the teaching profession itself in partnership with other educators, communities, districts, and states.* There is an imperative for new professional development strategies and for teachers themselves to take control of their personal professional development. For the past ten years it has been recognised that a 'culture of collegiality' is required. This can be achieved through an environment where teachers teach teachers in a supportive network of practice. (Little 1993, Lieberman & Miller 1991, Warren & Roseberry 1992). There are no simple remedies, but it does seem understood that communication and collaboration are two of the keys.

On-line Community of Practice Design (e-CoP)

The symbiosis between education reform and the integration of technology into learning is profound: technology requires the rich learning environments envisioned by reformers; reform demands the power of technology to put people at the centre of their own learning. (Scrim, 1996 pp.1) Having established that there is value in community development and its potential for ongoing professional support, it is important to examine the circumstances under which the community of practice could effectively go on-line.

At present stage of development the group being formed represents a potential community. Andrews et al (2001 pp.1) describe these potential groups. *Demographic groups normally do not constitute communities. However, they have the potential for becoming on-line communities when individuals share common interests, needs and goals, have a desire to communicate with a peer group, and can easily find each other to establish relationships.* The StageStruck On-line Community is taking the demographic group of K-12 teachers of the performing and creative arts and linking them together firstly through an on-line network then through to an opportunity to build community with active facilitation and support. This growth from a distributed set of individuals in contact on-line through to a loosely tied network for sharing and on to a fully-fledged collaborative community is a lengthy process determined by the effectiveness of the management and facilitation and the commitment elicited over time from the members.

Demographic group (DG) > **Network** (N) > **Community** (C)

distributed individuals *loosely tied individuals* *interpersonally tied group*

Diagram 1: The forming of communication and collaboration between individuals toward community (Stuckey et al, 2002)

It has taken two years in planning and web design and development and promotion to get to what Wenger (1998) describes as the second phase of community development; Coalescing. The focus of 2000 was the research, literature review and study of cases of on-line professional development and the design of the web site in response to teacher needs and concerns. During this year contacts were made and groups identified that might be integral to design of and dissemination about the community site. Finding out just who is in this demographic group has proven to be an ongoing task. In 2001 the development of the architecture became the focus. Advertising the site and reaching out to teacher groups to elicit membership and teacher concerns about focus innovation CD-ROM technology. Establishing a critical mass of members for the network and connecting those people through the web site has taken much longer than was anticipated in this phase. There were 200 members of the site at the time of this publication.

In the naivety of the web design model, the author fell into a trap that has no become legend to those involved in community development. While it is possible to build a static Web site, advertise it well and have thousands of hits follow, community success is both much slower and much more human-to-human interfaced. Users were registering, they were using the examples and demonstrations but they were not communicating with the mangers not with each other. When users were found to not be contributing or sharing, it became necessary to revisit those successful cases of community and find out what necessary to revisit those successful communities and delve deeper into the cases by interviewing community leaders, facilitators and mangers. It became evident that larger group open communication was not the way to start, and this was especially true with teacher communities. All evidence pointed to the need for small more purposeful nodes within the larger community as a way to start the development of bonds and identity within the community. It was about comfort and trust.

In mid 2002 members will see the main activity, communication, collaboration and facilitation is targeted specifically toward community building in smaller group activities. Early adopters of StageStruck are being invited to join projects and to work in teams to produce curriculum support materials for the community and to mentor new users. It is hoped that new users will find the community a safe place to seek technological and pedagogical support and to celebrate the use of StageStruck through the publishing and sharing of student works and teaching resources. Various groups within the performing arts community are to be given areas of the site to make their own and to develop new events, ideas, projects and resources. Initial facilitation on the site will come from the author and researcher, an experienced practitioner from within the domain. Eventually it is hoped that facilitation can be devolved to the community members and indeed that the members will contribute to and design the new spaces and facilities of the site in the future.

In summary

It is argued that computer mediated communication cannot build a community. (Weinrich, 1997; Fernback & Thompson, 1995) and Wenger himself describes establishing communities of practice as 'the art of balancing design and emergence' (Wenger, 1998 pp. 9). Sharp argued that the literature on on-line communities points to '…a weaker sense of community, a discourse commu nity' (Sharp 1997 pp. 6) and he went on to advance a set of actions likely to increase the success of communities of practice. These actions include face-to-face activities and groups wherever possible and opportunities for short-term mentoring. Even in the highly technological environment of the Internet we can see that technology alone cannot support all that true community requires.

It remains to be seen whether the rationale and carefully researched and socially supported on-line structures represented here will develop a level of commitment and engagement that can be described as community or whether as a network they will serve to meet the needs of the practitioner innovators that they seek to serve. There are many technological innovations that need to provide effective pathways and environments for adoption and implementation There are many demographic groups consisting of distributed and independent individuals like medical practitioners or in-service teachers that could be served by the effective design of communication and community built through on-line engagement. The understandings and lessons to be learned, over the next year, as these two projects apply the communities of practice theory to affordances of on-line technologies will have ramifications for those seeking effective long term strategies for adoption of many tools of innovation.

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Footnote: The authors of this paper met in the **Foundations of Communities of Practice** workshop lead by Etienne Wenger. [http://www.cpsquare.com/edu/foundations/index.html] This event is significant for it is the topic of community that brings knowledge managers, facilitators, educators and researchers from industry, education, government and non-profits organisations together. It did not take long to realise that supporting medical practitioners to embrace a technology in their evidence-based medicine was not unlike bringing teachers of the performing arts to embrace technology in their teaching of creativity. Indeed after some examination of the concerns of both groups the likeness became even stronger. These similarities will hopefully continue to be drawn out as the research progresses. The authors would be keen to join with any other designers seeking to support the use of innovative technological tools.

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